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DEVELOPMENT OF IMPROVED PASTURES ON THE ROUGH
AGRICULTURAL LAND OF SOUTHERN INDIANA

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A project was initiated in 1950 to study methods for improving pasture production on the rough agricultural uplands of Southern Indiana. Experiments were conducted at four locations in Harrison, Lawrence, Spencer and Martin counties. Studies included fertilizer trials with an alfalfa-Ladino clover-bromegrass mixture and species trials with grass-legume combinations and with winter small grains. Yields were below normal during much of the period from 1950-55 due to drought. Plots at the Harrison County location had to be seeded four times during the five year period.

SPECIES MIXTURES: Forage yields of 20 different grass-legume mixtures (cut at the hay stage) showed that the highest yielding mixtures were those which included alfalfa as the principal legume. Mixtures containing Ladino clover or birdsfoot trefoil as the only legume yielded, on the average, only 60% as much as those containing alfalfa; this difference would have been even greater in favor of the alfalfa mixtures if undesirable species had been separated out. Much of the poor showing of Ladino clover and birdsfoot trefoil was due to poor stands of these species established during years of drought.

Considering all years, all field locations and all legume companions, the five grasses tested (bromegrass, orchardgrass, timothy, tall fescue and bluegrass) yielded about equally well; however, bromegrass was the highest yielder when grown in combination with alfalfa plus Ladino clover. It produced about 700 lbs. more forage per acre than tall fescue, timothy or orchardgrass and 1,000 lbs. more than bluegrass. In 1955, the best season with respect to moisture supplies, yield differences among the different grasses were smaller. All grass mixtures in combination with alfalfa or alfalfa plus Ladino clover, yielded nearly four tons of dry forage per acre in 1955 and averaged about three tons per acre for the 1950-1955 period. Yields of the various mixtures during different years are shown in table 1.

*Project 569 - Published for Mimeo ID-9, "Report of Progress in Research on the Southern Indiana Forage Farm - May, 1956"

Table 1. Yield Results of Species Trials in Southern Indiana
1952-1955 Project 569

Mixture	Lbs. dry forage per acre				
	Lawrence	Harrison	Martin	Spencer	Average all
	County	County	County	County	locations-all
	Average		Average		years
	1952-55	1955	1953-1954	1954	1952-55
Al-La-Fe	6199	8248	4347	4762	5812
Al-Fe	6235	8042	4048	5360	5805
Bf-Fe	3568	5919	4235	3216	3782
La-Fe	3864	4763	3247	4047	3845
Ave	4967	6743	3766	4346	4811
Al-La-Br	7621	8450	4137	5054	6533
Al-Br	6921	8055	3947	4585	6027
Bf-Br	3766	4345	2677	4024	3599
La-Br	4112	3631	3528	3161	3787
Ave	5605	6120	3572	4206	4986
Al-La-Ti	6736	7163	3887	4591	5809
Al-Ti	6854	7708	4381	5457	6167
Bf-Ti	3950	5530	2496	4201	3815
La-Ti	4188	5122	3719	2940	4031
Ave	5432	6380	3621	4297	4956
Al-La-Bg	6306	7567	3478	4359	5513
Al-Bg	6386	7669	4921	4726	5973
Bf-Bg	3114	3992	2772	3421	3177
La-Bg	3403	3510	3163	3175	3328
Ave	4802	5685	3584	3920	4498
Al-La-Or	6347	7751	4348	5019	5856
Al-Or	6296	7560	3812	5244	5701
Bf-Or	3864	5637	3173	4208	3956
La-Or	5583	5954	3094	3693	4770
Ave	5523	6692	3607	4541	5066
Ave For All Mixtures	5265	6324	3630	4262	4863

Al-alfalfa; Bf-birdsfoot trefoil; La-Ladino clover; Fe-tall fescue;
 Br-bromegrass; Ti-timothy; Bg-bluegrass; Or-orchardgrass.

With poor legume stands (Ladino clover or birdsfoot trefoil) yields of grasses were greatly reduced due to nitrogen deficiency, but those of bromegrass, bluegrass and timothy were decreased more than those of orchardgrass or fescue. When legumes were absent, the first three grasses were yellowed and weak, although all three are good yielders when adequate nitrogen is supplied.

SMALL GRAINS FOR FORAGE: Evidence was gained that rye, winter wheat, winter barley, and winter oats may extend the grazing season both into late fall and early spring. In clipping studies a ton or more of dry forage was obtained between the middle of March and the middle of May. Rye gave the earliest growth, followed by wheat, barley and oats. It appears that these cereals can be successfully interplanted into established sods, thus reducing the possibility of serious erosion on steep land and also affording better footing for late fall and early spring grazing.

FERTILITY STUDIES:

a. Fertilization at seeding.

Phosphate - Fertility studies with an alfalfa-Ladino-clover-brome-grass mixture showed that the low level of available phosphate in soils is an important limiting factor in the productivity of grass legume mixtures in this area. Phosphate additions at seeding were observed to increase yields by as much as 2,000 lbs. of dry forage per acre, doubling yields in some instances. Most of this response was obtained with the first 100 lbs. of P_2O_5 added per acre. Increases were more pronounced at the first and second cuttings than at the third. Phosphate also had a marked effect on the botanical composition of the plots. The plots with no added phosphate lost most of their alfalfa stand by the second year and were taken over by lespedeza, while the phosphate treated plots had a good stand of alfalfa.

Potash - Potash also becomes limiting in established stands of legumes and grasses which are producing high yields, but the soil supply of this element seems adequate for stand establishment in the area studied. Potash response obtained in these experiments was confined to the second harvest.

Nitrogen - Nitrogen added at seeding (50 lbs. per acre broadcast as ammonium nitrate) had no significant effect on yield, but did seem to increase seedling vigor of grasses and give better stand balance.

b. Maintenance Fertilization

The data obtained are inconclusive regarding yearly maintenance requirements for phosphate and potash on grass-legume mixtures. It is estimated that a minimum of 60 lbs. of P_2O_5 and 60 lbs. of K_2O per acre per year will be needed to maintain maximum yields, but this will depend upon how much fertilizer was applied at seeding. An experiment designed to study this question was initiated on the Southern Indiana Forage Farm during 1955.

PLANS FOR FUTURE RESEARCH:

1. A study has been started at the Southern Indiana Forage Farm to determine the most efficient combinations of phosphate and potash for establishment and maintenance of high forage yields, using alfalfa -- orchardgrass mixture.

2. For 1956 a study is planned to determine the value of rock phosphate in forage fertilization for Southern Indiana.
3. Another project planned when funds became available will involve a study of the value of nitrogen fertilized grasses as substitutes for grass-legume mixtures.
4. A study of the nutritional requirements of birds-foot trefoil is planned also for 1956. More specifically, this study will investigate why this plant is better adapted to some soil types than others.